

Notice of Allowability	Application No.	Applicant(s)	
	10/045,681	SCHWADERER, CURT	
	Examiner	Art Unit	
	Philip B. Tran	2155	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 09/30/05.
2. ☒ The allowed claim(s) is/are 1 and 5-16.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. <input type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date <u>8/15/05</u> 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>Attached</u>. 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input type="checkbox"/> Other _____ |
|---|---|


BHARAT BAROT
PRIMARY EXAMINER

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

2. Authorization for this examiner's amendment was given in a telephone interview with Mr. Rosenberg (Reg. No. 44,308), the undersigned, on October 14, 2005 and on October 17, 2005. The application has been amended as follows:

IN THE CLAIMS:

Claims 1 and 5-16 have been amended.

Claim 1 has been amended as follows:

1. (Currently Amended) A method of forwarding information packets operating on a multiple element computer having primary and secondary computing elements, said method comprising **steps of**:

providing a multiple element computing system having a primary computing element and a secondary computing element in operative communication with each other;

building a table comprised of a plurality of entries with addresses associated therewith wherein said entries are organized hierarchically according to an LC-Trie compression algorithm operating on said addresses;

receiving an information packet within said computer system wherein said information packet has a destination address associated therewith;

searching said table using an LC-Trie search algorithm to find a match between said address of an entry in said table and said destination address of said information packet;

transmitting said information packet to a forwarding address associated with said address of said matching entry;

wherein said steps of said method are performed by a forwarding table manager application running on said primary and said secondary computing elements;

wherein said table comprises an LC-Trie search table and a next-hop table associated together, wherein said LC-Trie search table comprises information from said LC-Trie compression algorithm and wherein said next-hop table comprises information necessary to transmit said information packet to said forwarding address associated with said matching entry;

wherein said LC-Trie search table entries comprise a branching factor, a skip value, and an LC-Trie/Next-Hop Offset generated for each of said plurality of entries by said LC-Trie compression algorithm during said building step; and

wherein said next-hop table entries comprise said address field containing said IP address of said matching entry identified in said searching step, and an opaque data field for storing specialized packet processing information.

Claim 5 has been amended as follows:

5. (Currently Amended) The ~~invention~~ method in accordance with claim 1 wherein said next-hop table entries further comprise a mask length field containing a mask length of said entry, and said method further comprises the step of verifying that said address of said matching entry and said destination address of said information packet match to at least said mask length.

Claim 6 has been amended as follows:

6. (Currently Amended) The ~~invention~~ method in accordance with claim 5 wherein said next-hop table entries further comprise a next-hop backup offset field that references a previous entry in the hierarchy created in the building step, and said method further comprises a second step of verifying performed if said verifying step fails, that verifies that said address of said previous entry and said destination address of said information packet match to at least a mask length number of bits of said previous entry.

Claim 7 has been amended as follows:

7. (Currently Amended) The ~~invention~~ method in accordance with claim 1 wherein said opaque data field further comprises MPLS tags.

Claim 8 has been amended as follows:

8. (Currently Amended) The ~~invention~~ method in accordance with claim 1 wherein said opaque data field further comprises quality of service parameters.

Claim 9 has been amended as follows:

9. (Currently Amended) The ~~invention~~ method in accordance with claim 1 wherein said opaque data field further comprises encryption handling parameters.

Claim 10 has been amended as follows:

10. (Currently Amended) The ~~invention~~ method in accordance with claim 1 wherein said addresses comprise IP addresses, and said opaque data field further comprises VLAN tags.

Claim 11 has been amended as follows:

11. (Currently Amended) The ~~invention~~ method in accordance with claim 1 wherein said opaque data field further comprises a port specific field for accessing said forwarding address identified in said transmitting step.

Claim 12 has been amended as follows:

12. (Currently Amended) The ~~invention~~ method in accordance with claim 11 wherein said addresses are IP addresses.

Claim 13 has been amended as follows:

13. (Currently Amended) The ~~invention~~ method in accordance with claim 12 wherein said next-hop table entries further comprise a flag field wherein if said flag is set said port specific field contains an offset to an entry in said next hop table containing said forwarding IP address indicating said forwarding IP address addresses a network route, and if the flag is not set said port specific field contains said forwarding IP address indicating said forwarding IP address addresses a host route.

Claim 14 has been amended as follows:

14. (Currently Amended) The ~~invention~~ method in accordance with claim 1 wherein said computer system comprises a network processor with a core processor and at least one microengine, and said primary computing element is said core processor and said secondary computing element is said microengine.

Claim 15 has been amended as follows:

15. (Currently Amended) The ~~invention~~ method in accordance with claim 14 wherein said step of building said table is performed by said forwarding table manager on said core processor, and said step of searching said table is performed on said microengine by said forwarding table manager.

Claim 16 has been amended as follows:

16. (Currently Amended) A method of forwarding information packets operating on a multiple element computer system having a network processor with a core processor and at least one microengine, said method comprising steps of:

providing a multiple element computing system having a network processor with a core processor and at least one microengine in operative communication with each other;

building an LC-Trie search table and a corresponding next-hop table comprised of a plurality of entries with IP addresses associated therewith:

wherein said LC-Trie table comprises a branching factor, a skip value, and an LC-Trie/Next-Hop Offset generated for each of said plurality of entries by an LCTrie compression algorithm that hierarchically organizes said entries; and wherein said next-hop table entries comprise:

said IP addresses with a mask length;

a destination IP address associated therewith;

a next-hop backup offset field for locating a previous entry in said nexthop table;

an opaque data field for storing specialized packet processing information, comprising, a port specific field, a VLAN tags, quality of service parameters, and encryption handling parameters; and

a flag field wherein if said flag is set said port specific field contains an offset to an entry in said next hop table containing a forwarding IP

address indicating said forwarding IP address addresses a network route,
and if the flag is not set said port specific field contains said forwarding IP
address indicating said forwarding IP address addresses a host route;
receiving an information packet within said computer system wherein said
information packet has a destination IP address associated therewith;

searching said LC-Trie table using an LC-Trie search algorithm to find a match
between said IP address of said corresponding entry in said next-hop table and said
destination IP address of said information packet;

verifying that said IP address of said matching entry and said destination IP
address of said information packet match to at least said mask length;

verifying, if said pervious verifying step fails, that said IP address of said previous
entry and said destination IP address of said information packet match to at least a
mask length number of bits of said previous entry represented by said entry in said
next-hop backup offset field;

transmitting said information packet to said forwarding IP address associated
with said IP address of said matching entry; and

wherein said steps of said method are performed by a forwarding table manager,
wherein said step of building said table is performed by said forwarding table manager
on said core processor, and said step of searching said table is performed on said
microengine by said forwarding table manager.


REASONS FOR ALLOWANCE

3. Claims 1 and 5-16 are allowed.

4. The following is an examiner's statements of reason for allowance:

The examiner has found that the prior art of record does not appear to teach or suggest or render obvious the claimed limitations in combination with the specific added limitations as recited in independent claims and subsequent dependent claims. The prior art of record fails to teach or suggest a method of forwarding information packets operating on a multiple element computer system having primary and secondary computing elements comprising steps of building a table of entries with addresses associated therewith organized hierarchically according to an LC-Trie compression algorithm and searching said table using an LC-Trie search algorithm are performed by a forwarding table manager application running on said primary and said secondary computing elements wherein said table comprises an LC-Trie search table and a next-hop table associated together, wherein said LC-Trie search table comprises information from said LC-Trie compression algorithm and wherein said next-hop table comprises information necessary to transmit said information packet to said forwarding address associated with said matching entry and wherein said LC-Trie search table entries comprise a branching factor, a skip value, and an LC-Trie/Next-Hop Offset generated for each of said plurality of entries by said LC-Trie compression algorithm during said building step and wherein said next-hop table entries comprise said address field containing said IP address of said matching entry identified in said searching step, and an opaque data field for storing specialized packet processing information.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip B. Tran whose telephone number is (571) 272-3991. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.
7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Philip B. Tran
Art Unit 2155
October 17, 2005


BHARAT BAROT
PRIMARY EXAMINER